NHOSP technical bulletin 12
Spring 1998

ROADS

Guidance on Design, Construction and Approval for Local Planning Boards

INTRODUCTION

Streets and roads are much more than a way to get from one place to another. They open views, as well as access. Roads set the pace and safety of traffic by their design. Streets are used by cyclists, pedestrians, and joggers, and by children in residential neighborhoods, as well as by motor vehicles. In residential and commercial neighborhoods, streets serve important social and aesthetic functions, bringing people together, or keeping them apart. The scale and design of a road should be appropriate to its function, and should relate to overall community planning.

This bulletin will help local planning board members learn to read and interpret development site plans, and know what questions to ask. Citizen planners have an important role in reviewing development proposals within the context of the local master plan, the natural and physical features of the site, surrounding land uses and existing roads. They should not be intimidated by technical and engineering jargon, but should ask questions and bring a healthy dose of common sense to this important aspect of community planning.

To best serve community goals as expressed in the master plan, and the features of the site and surrounding areas, planning board members must bring flexibility and creativity to the subdivision and site plan review process. Planning boards must balance transportation needs with the safety of all types of uses, livability and attractiveness, social needs and considerations, cost-effectiveness and housing affordability, and environmental impacts.

In this bulletin, 'construction' may refer to either new road construction, or improvement of existing roads. 'Board' refers to the local planning board. Information about publications cited in this bulletin can be found in the section Where to go for more information following the CONCLUSION.

Part I. FUNCTION

Different streets have different functions, and should be designed accordingly. Depending on where and why they are built, roads provide: traffic conveyance; direct access to homes, businesses and other roads; support for pedestrian and bicycle travel; a visual setting for the community or neighborhood; an informal neighborhood meeting place; and play area for children.

Recent trends in road design and planning emphasize the many functions of roads and their impacts on quality of life, not just efficiency of traffic conveyance. Many communities are turning away from the wide, flat, and straight street designs that encourage excessive traffic speed, and create unattractive streetscapes. More communities and developers are using 'traffic calming' design techniques to create safer, more livable communities. (See *Take Back Your Streets*) The first step in reviewing road design and construction plans is to determine the road's role within standard road hierarchy, and the functions it will serve.

Hierarchy

Each street is classified by a four-category road hierarchy system, and should be evaluated within the context of its connection to the local or regional road system. Average Daily Traffic (ADT) projections are

also a factor in classifying roads. ADT is calculated by multiplying the estimated number of vehicle trips by the number of units. For example, if a single-family home generates 10 trips per day, a seven-lot subdivision would result in an ADT of 70. (For more information on traffic volumes generated by various types of development, see *Trip Generation*.)

In the real world, planning boards are concerned with improving existing roads or approving subdivision roads that may not perfectly conform to the ideal hierarchical system. But an understanding of street hierarchy is useful to a planning board in making decisions about the type and intensity of development on particular roads, and in setting road work priorities for the capital improvements program.

Street Hierarchy Classification

- **Arterial.** An arterial is a high-volume street which conducts traffic between communities and activity centers, and connects communities to major state and interstate highways.
- **Collector.** The collector is the principal traffic conveyor within commercial or residential areas. The collector carries relatively high traffic volumes from arterials to lower-order streets. Its function in the road system is to promote free traffic flow, but may also serve abutting land uses.
- **Subcollector.** A subcollector is a relatively lower-volume street, providing passage from collector streets to neighborhood access streets. Subcollectors provide frontage and access to residential lots, but also carry some through traffic.
- **Access Street.** Access streets are the lowest-order streets, and usually carry no through traffic. Access streets are designed to provide access from residences to higher-order streets. These streets usually serve relatively few dwelling units. Examples are short streets, cul-de-sacs, and courts.

Classification by Jurisdiction

New Hampshire roads are also classified by state or municipal jurisdiction (see RSA 229:5) as follows:

- **Class I** - Trunk line highways of the primary state highway system are State highways maintained by state or federal funds.
- **Class II** - State aid highways on the secondary State highway system, are also maintained by either state or federal funds.
- **Class III** - Recreational roads leading to and within State reservations, such as state parks and state forests, designated by the legislature.
- **Class IIIa.** - All new boating access roads from any existing road to any public water in this state.
- **Class IV** - Portions of Class I and Class II State highways within urban compact areas designated by the Commissioner of Transportation (see RSA 229:5), and maintained by the city or town.
- **Class V** - All other roads which cities or towns are responsible for maintaining.
- **Class VI** - All other public ways for which the local municipality has no duty for maintenance, nor liability for accidents (RSA 231:50). Class VI roads are full public highways in all other respects.

The New Hampshire Municipal Association (NHMA) provides information and reference materials on roads in general, and on Class V and VI highways in particular. *A Hard Road to Travel*, revised and updated for 1997, is an excellent reference for New Hampshire law about local roads, streets, highways, and trails. (See Where to go for more information.)

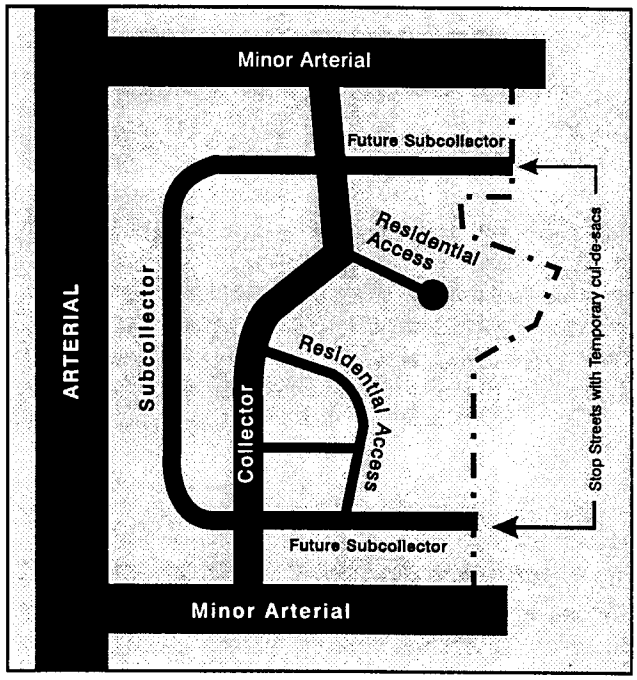


Figure 1. Relationship Among Road Types

Part II. BASICS OF ROAD DESIGN

Engineers base road design on projected traffic volume, vehicle weight, and traffic speed, as appropriate to the road's functions. Design involves pavement width, roadbed and surface materials and thicknesses, grade, corners, slope, drainage, shoulder width, etc. Traffic volume (ADT) and speed determine the geometry of a road, the curves, surface slope and width, grade, hills, etc. Weight determines the road base and surface thickness and construction materials.

Sound road design considers topographic features, to assure proper road function and to minimize impacts to vegetation and other natural features. The nature of the soil will influence appropriate engineering specifications such as load bearing capacity and erosion potential. Flexible street alignment and design standards allow new roads to fit well with the land, and preserve the natural features of the area as much as possible. When reviewing road plans, look at how the design relates to the terrain and topographical features.

Roads should not cross topographic contour lines at right angles, especially in steep terrain. (These are the lines on a map connecting all points of equal elevation.) Following contours closely not only minimizes the amount of earth needed to be removed and replaced (known as 'cut and fill'), but also minimizes erosion during construction and the life of the road.

Keeping pavement width to a minimum reduces stormwater run-off, reduces construction and maintenance costs, lowers ambient temperatures, reduces vehicle speed and noise, and helps preserve natural features.

Local subdivision regulations should specify design standards for the construction of roads. Most New Hampshire towns have followed the *Minimum Geometric & Structural Guides for Local Roads and Streets* (April 1990) and *Suggested Minimum Design Standards for Rural Subdivision Streets* (April 10, 1995), developed by the NH Department of Transportation (NH DOT). These publications, and *Standard Specifications for Road and Bridge Construction* (revised 1997), are all available from the NH DOT Bureau of Municipal Highways.

Towns may adopt more stringent guidelines, and should consider the minimum design requirements of Table 1 in Appendix B in the *Subdivision and Site Plan Review Handbook* (May 1995) by the Southwest Region Planning Commission, also available from OSP.

Towns should adopt standards consistent with sound design and with planning principles stated in the master plan. Whether public or private, all streets should be built according to standards adopted by the town.

However, provision for reduced design requirements in appropriate situations will allow the board necessary flexibility. For example, small subdivisions or areas which will generate little traffic do not need the wide roads suited to large subdivisions or heavy-traffic commercial areas.

The planning board may choose to waive certain requirements, such as pavement type or width, for roads in small subdivision areas or limited-use commercial areas with little traffic expected.

Rights-of-way

Rights-of-way should be kept consistent for collector and arterial streets, in case the road needs widening in the future. Maintaining right-of-way widths of a minimum 50 feet, even for narrower roads, will allow for future widening, utilities or service needs, and for adequate drainage. Roads in large subdivisions or high-traffic commercial areas call for wider shoulders and more sophisticated drainage systems to withstand the demands of heavier use. But *Residential Streets* advises that blanket requirements of 50-feet or more are seldom justified for subcollectors and access streets.

Calming Traffic in the Age of Road Rage

Safety is the first consideration in residential street planning. Residential streets should be designed for

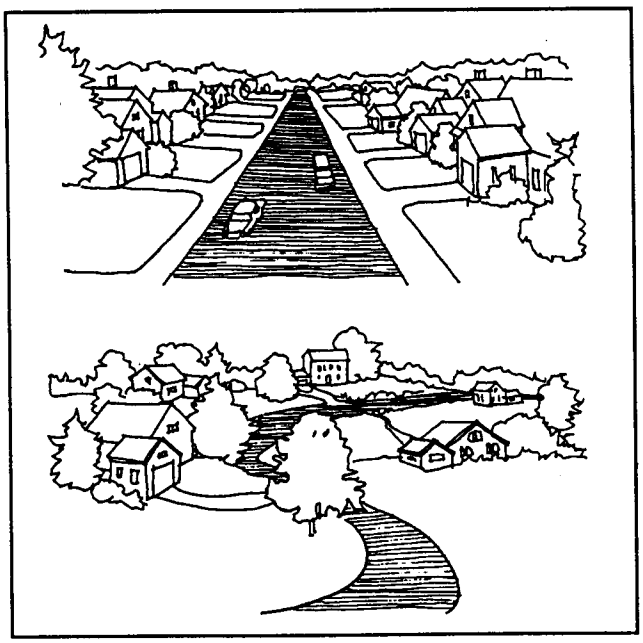


Figure 2. Winding vs. straight residential street.

low vehicle speeds. *Traffic Calming* suggests road design techniques using active or physical controls (bumps, barriers, curves, rumble strips, etc.), and passive controls such as signs and traffic regulations to reduce vehicle speeds.

Traffic-calming measures—also advocated in the Conservation Law Foundation guide, *Take Back Your Streets*—foster safer and quieter streets that are more hospitable to cyclists, pedestrians, and joggers, and enhance neighborhood and downtown environments. Keeping pavement and travel lanes to a minimum width appropriate to a street's function helps keep speed down and preserves a more appealing streetscape.

Wide, straight streets with long sight distances encourage faster speeds. Alignment of intersections, curves and hills, access points to the street, parked cars and other obstructions on the street all affect driver speeds and attention.

Cartway Widths

The cartway is the area of the street where vehicles are permitted to travel or park. *The Subdivision and Site Plan Handbook* (CUPR) suggests cartway widths ranging from 18 feet for a rural residential lane, to 36 feet for a residential subcollector in an area of highly intense development with parking on both sides of the road. A cartway of 18 feet is sufficient for lower-order streets. *Residential Streets* suggests that a shared driveway that branches off to serve four or five houses needs a pavement width of 16 feet, enough for two cars to pass.

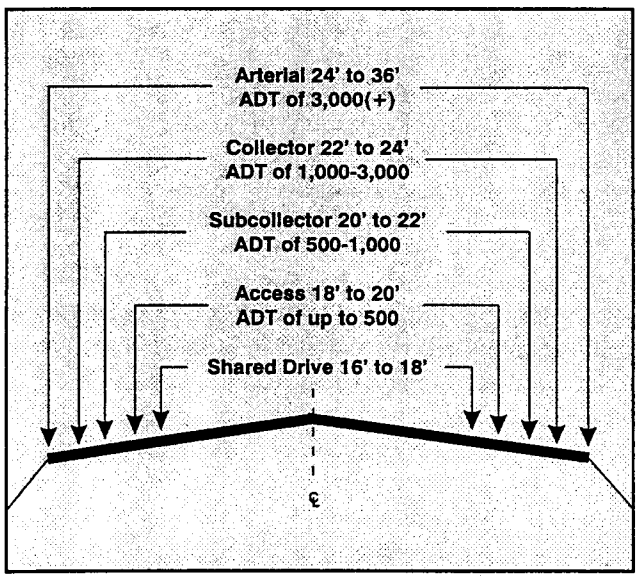


Figure 3. Recommended Pavement (Cartway) Widths

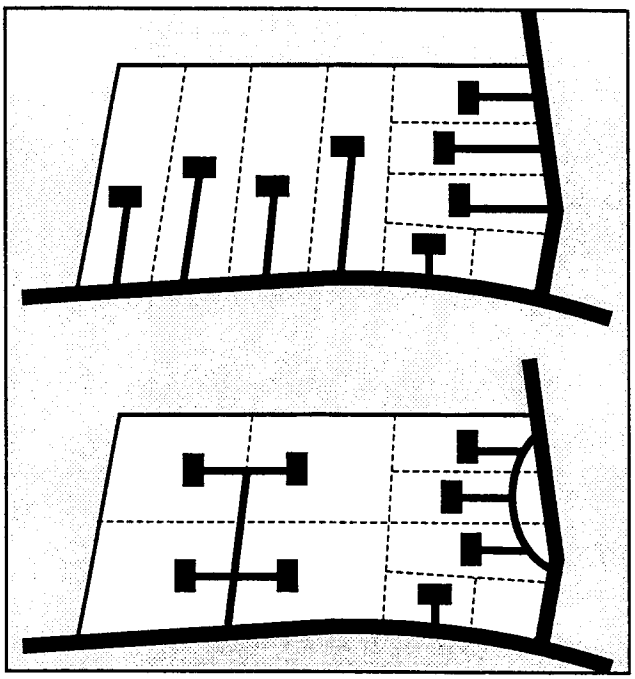


Figure 4. Drives, interior roads and backlot development.

Neighborhood Access

Residential areas should have convenient, safe access to arterial streets. Avoiding through traffic use of residential areas promotes safety and a sense of community. If a residential area will have more than one access to arterial streets, entrances should be located so that they do not encourage short-cutting through traffic. Indirect connections or routes to collectors or arterials discourage through traffic. Curved, narrow streets discourage high speeds, and frequent stops or intersections will discourage through traffic.

New residential development along existing roads presents other challenges to communities. The cumulative effect of the increasing number of driveways alters the town's rural character, and can create safety hazards. Planning boards can allow, encourage, or require alternatives where appropriate. Shared drives, private roads accessing multiple lots, and backlot development using shared drive or alley access can increase safety, result in a more visually appealing setting, and make more efficient use of the land. Specific standards can be included in the town's subdivision regulations to address these situations. Additional techniques can be found in *Preserving Rural Character, Residential Streets,* and *Dealing with Change in the Connecticut River Valley*.

Dead-End Streets and Cul-de-Sacs

Dead-end streets ending in a cul-de-sac or other turn-around area are generally acceptable for 20-25 lots. Road length can vary according to lot frontage-width. More houses than the recommended maximum would generate traffic volume more suited to a collector or sub-collector street. For a larger subdivision, several dead-end streets might be planned to terminate in the same area, creating open space with easy access for residents. Foot and bicycle paths in these spaces can increase sociability and connections between cul-de-sac micro-neighborhoods, creating what has been called 'live-end streets.'

Paved turn-around areas should be kept to a minimum. A 30-foot radius is adequate. Larger vehicles may have to use a backing maneuver to turn, but snow plows, school buses, and lost drivers are generally the only vehicles needing to use the turn-around. Residents, visitors, delivery trucks, and service vehicles will usually turn using the driveway. Larger paved turn-arounds increase stormwater run-off, and construction and maintenance costs.

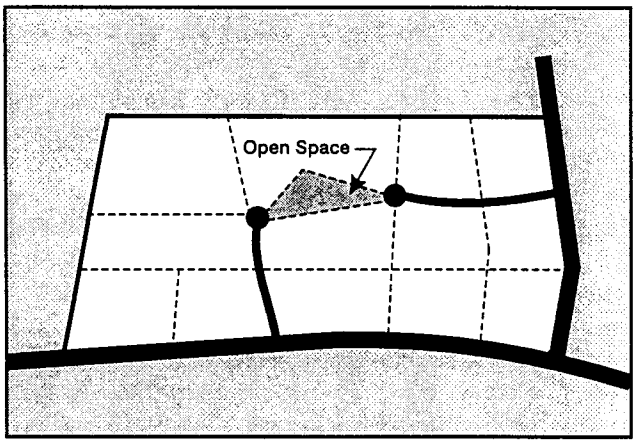


Figure 5. Cul-de-sacs ending in common space

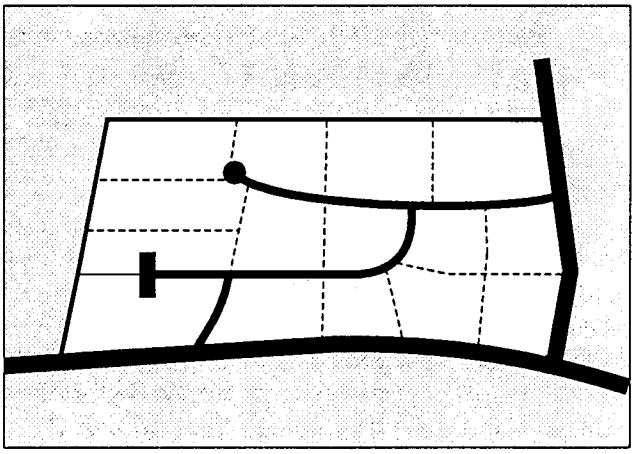


Figure 6. Different types of cul-de-sacs

Intersections

An intersection is where two or more roads cross at grade without a bridge. Right-angle (90 degree) intersections are the most comfortable for drivers, and allow the most direct view of traffic. Acute-angle intersections require awkward turning maneuvers, and should be kept to a minimum of 60 degrees. Property line radii at the intersection should be no less than 20 feet. Make sure sight distance is adequate in both directions for vehicles entering the main street.

Small traffic circles or round-abouts are useful for some intersections of residential, non-arterial streets. A round-about is a small, raised island (usually about 18' in diameter) built at the intersection of two streets. Large enough to slow traffic down without restricting it, a round-about is landscaped or planted with trees, and surrounded by a curb.

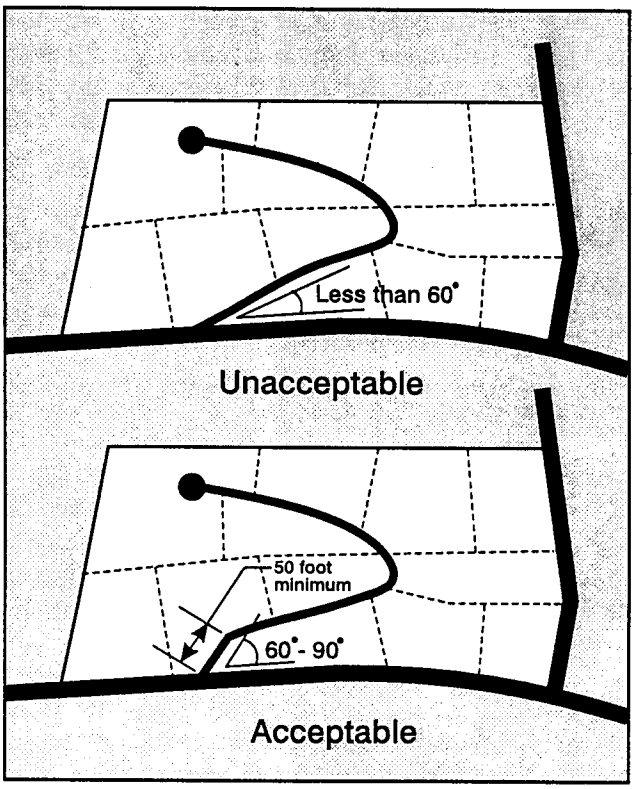
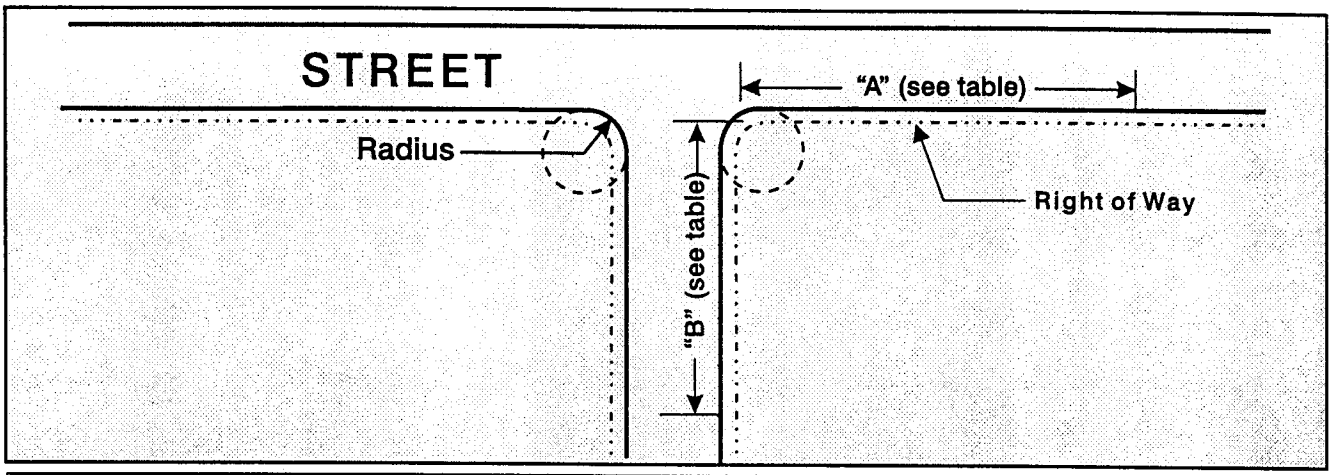


Figure 7. Intersections



Typical Sight Distance Requirements by Street Type (measured along R.O.W. line) — Sight Distance Street "A" ← (in feet) →		Sight Distance Street "B" ↓ (in feet) →	Residential Access	Residential Subcollector	Residential Collector	Arterial
30	Residential Access		30	100	120	130-150
100	Residential Subcollector		30	100	120	130-150
120	Residential Collector	*Plus*	30	100	120	130-150
130-150	Arterial		30	100	120	130-150
	Curb Radii		25	30	35	

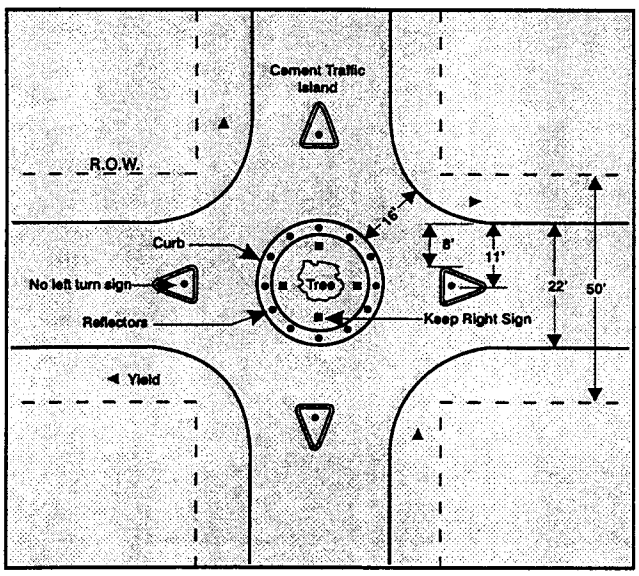


Figure 9. Roundabout

Curbing

Curbing is used to control drainage, protect pavement edges, and protect sidewalks and lawns from vehicles. The three general types of curbs are: concrete or granite barrier (or vertical) curb, concrete mountable curb, and asphalt rolled curb. Curbs may not be necessary, or desired, in lower-density areas.

Before deciding to curb, or not to curb, consider the method of handling stormwater, since curbing requires a closed drainage system using catch basins and underground culverts. Without curbing, simple sheet drainage off the sides of the road is an option. Another factor is the amount of on-street parking expected. The expense of curbing, and the desired appearance of the development should also be considered. Curbs protect grass from snow plows, but plows may damage the curb, requiring maintenance.

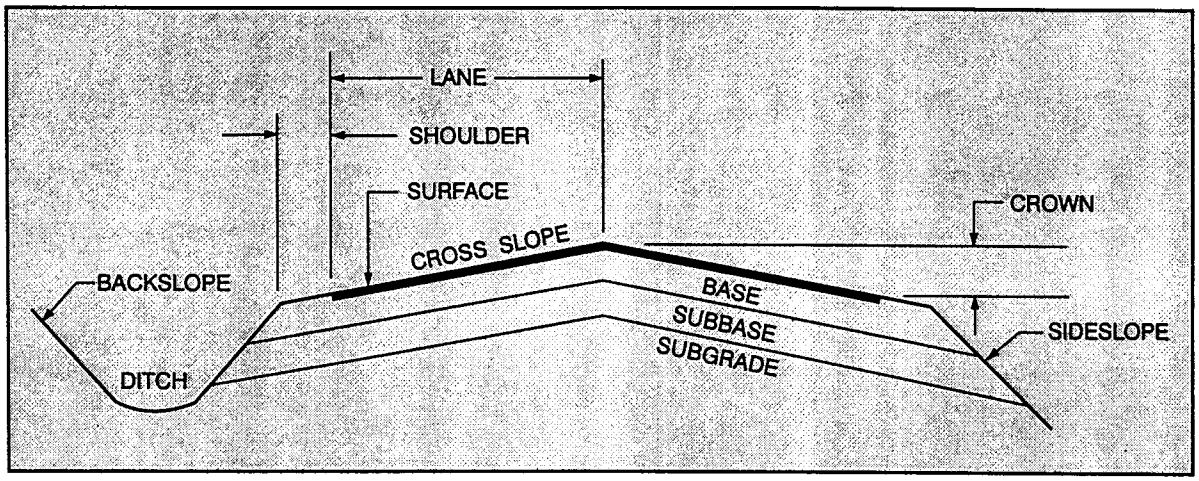


Figure 10. Road cross-section

Sidewalks

Requiring sidewalks as part of a road network is appropriate in some areas. Pedestrians and motor vehicles must be separated on streets with significant vehicle and pedestrian volume. Sidewalks can be included in the road standards, as part of the road cross-section, or provided for separately with pedestrian paths that do not follow the road right-of-way. Planners should exercise flexibility to locate sidewalks or pathways to best suit the needs of the subdivision and adjacent uses.

Planners must weigh the costs of sidewalks against the benefits in low-density situations. Low-volume streets and cul-de-sacs may themselves serve the functions of supporting pedestrian traffic, socializing, etc. A range of options for handling pedestrian traffic gives planners and developers flexibility.

Roadside slopes formed by placement or removal of material, should be uniformly graded. Slope on the side of a road in ledge should be no greater than two horizontal to one vertical. In all other materials, roadside slope should not exceed three horizontal to one vertical.

Bicycle Paths

Subdivision density, motor vehicle traffic volumes on nearby streets, residents' preferences, and proximity to schools, parks, and other bike-trip generators determine the need for bicycle paths. Planners should also consider the location of the proposed subdivision in relation to any established or planned town-wide or region-wide bicycle route systems.

Cyclists can share paths with pedestrians for low-speed, low-volume use, particularly when paths loop through a subdivision, and are not used by through traffic. An 8-foot width is desirable for a shared path. Pavement striping can help separate foot from bike traffic. However, conflicts can arise when paths are shared by pedestrians and high-speed cyclists or commuters. If these uses will predominate, consider a bicycle-only path at least 5 feet wide.

Smaller towns may accommodate bicycle traffic with a wider street with a marked bike lane of 4-5 feet. If this is not possible, at least provide a wider paved area on the outer edge of the street so cyclists can stay outside the traffic lane.

Steep Grades

Streets should follow land contours as much as possible to avoid overly steep grades, which can be hazardous, especially in New Hampshire winters, and prone to excessive erosion and sedimentation. Grades of 1% up to 5% are considered relatively flat, while grades from 5% to 10% are categorized as relatively steep. Grades over 10% become unmanageably steep for plowing, etc.

Where grades of 4-5% or steeper are necessary, drainage design is critical to avoid erosion and sedimentation and contamination of waterways. For measures to manage drainage and erosion, refer to *Stormwater Management and Erosion and Sediment Control for Urban and Developing Areas in New Hampshire.*

Special care must be given to grades at approaches to intersections. Aim for grades of ½-5% within 100 feet of an intersection, or a minimum 50 feet for local streets. Where a new road intersects with an existing road, the approach to the intersection should be flat, with a slight rise at the stop.

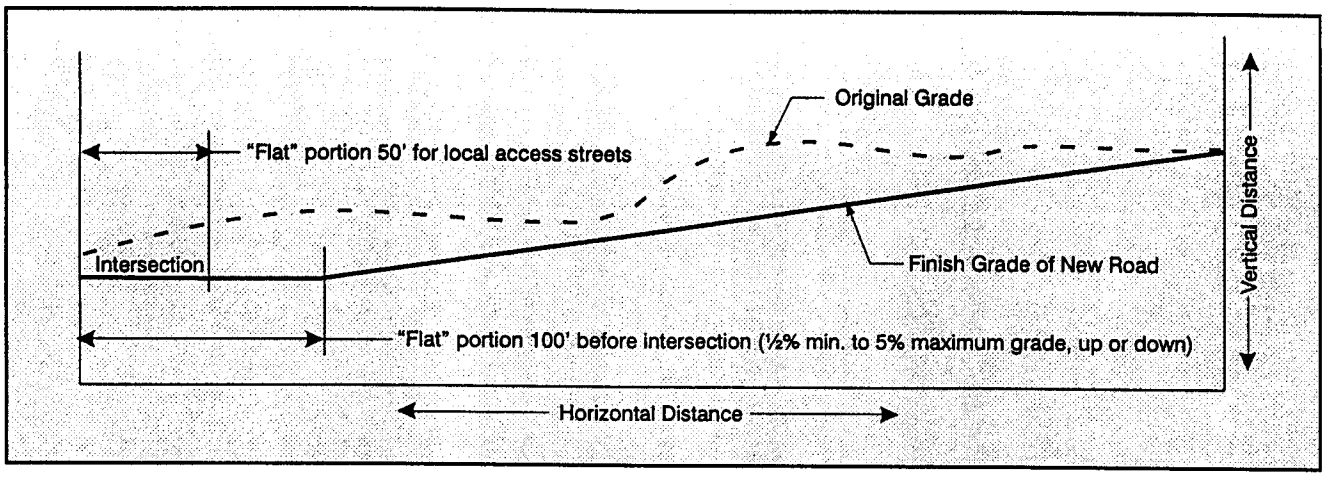
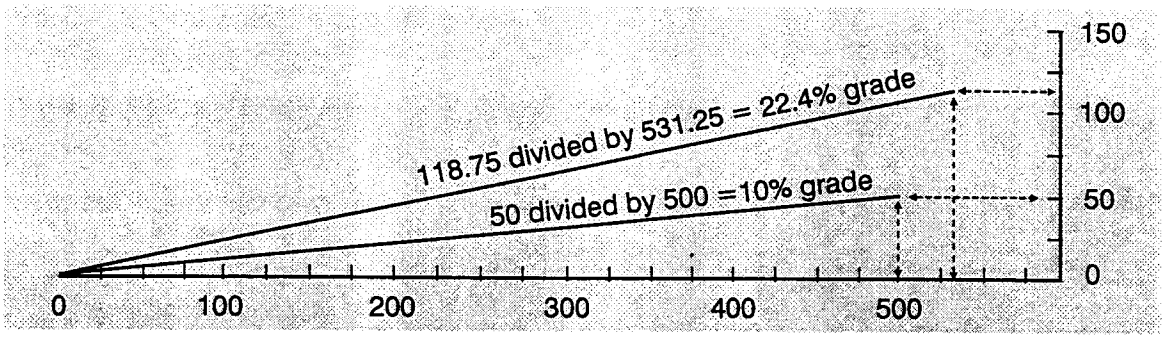


Figure 11. Road profile

Grades are shown as a profile or side view of the steepness of the road. Grades near intersections should be nearly flat. The original ground level is often shown as a dashed line, and the finished grade as a solid line.



Grade is determined by dividing the vertical distance (V) by the horizontal distance (H), and is usually expressed as a percentage. The higher the percentage, the steeper the grade. A 100% grade is a 45 degree angle. This is also known as "the rise over the run."
Grade = V/H = rise/run.

Superelevation

The technique used to bank a curve is called superelevation. Superelevation is the vertical distance between the inner and outer edges of highway pavement, designed to offset the effect of centrifugal force as a vehicle negotiates a curve. Superelevation is not usually necessary for most horizontal curves on low-speed, residential streets.

Pavement

Pavement designs should be suited to soil and site conditions and the function and traffic volume of the street. The basic components of street pavement are the subgrade, base and wearing surface layers. As the foundation layer of a street, the subgrade deserves close attention. Depending on the natural soils of the site, the subgrade can be the natural soil itself–if it meets load-bearing tests, is compacted soil, or is stabilized with additives.

The base course is usually constructed of aggregate gravel or crushed-stone materials, and may include a granular or modified soil sub-base layer. All granular base and sub-base layers should be compacted to acceptable standards. Functions of the base layer or layers include drainage and frost protection, and distribution of vehicle weight from the wearing layer surface to the subgrade.

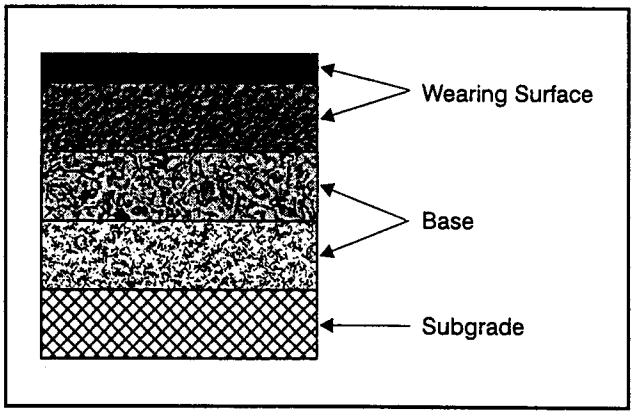


Figure 12. Pavement layers

Wearing surfaces are either paved or unpaved. Paved surface types include flexible, rigid, and composite. Flexible pavement types are most commonly used in New Hampshire, mostly constructed of hot mixed asphalt concrete (HMAC). The asphalt wearing surface is usually applied in two layers: a base asphalt layer is often installed in the early stages of a development to handle construction traffic, and the smoother surface layer, which can be applied after homes are built. The wearing surface layer distributes weight to the underlying layers, and resists deformation from the weight of vehicles.

Paving technology is a dynamic field of continuing research and improvement. Planners can get information and technical assistance from the UNH Technology Transfer Center (see Where to go for more information).

Stormwater Run-Off

A stormwater management plan should be required as part of the development review process. Carrying stormwater run-off is actually a secondary role of streets. When land is developed, larger volumes of rainwater run off quickly, because of the large areas covered by buildings and pavement. This creates potential for erosion and sedimentation and contamination of waterways. The design and construction of roads must provide for managing stormwater and controlling erosion. This is also an area of dynamic development of technology. Technical information is available from county conservation districts and the USDA Natural Resources Conservation Service (see Where to go for more information).

Stormwater Management and Erosion and Sedimentation Control for Urban and Developing Areas in New Hampshire lists recommended standards for stormwater management plans. Towns can incorporate these standards into existing development regulations by using the February 1997, *Model Stormwater Management and Erosion Control Regulation* (NHACD).

Review a required stormwater management plan to ensure it includes:

- Design and construction specifications for all structural (culverts, catch basins, etc.) and non-structural (vegetation, berms, ditches, etc.) stormwater management measures to be installed.
- Pre- and post-construction erosion control measures based on Best Management Practices (BMP's), including structural, non-structural, and vegetative measures.
- Prompt re-grading and seeding of disturbed areas, rounding of the top and bottom (toe) of slopes to meet existing grades, and lining swales with rip-rap or other suitable materials where run-off will be heaviest.
- A maintenance plan providing for periodic inspection and correction of any inadequacies found during or after construction.
- Consideration of the impacts of road design, construction, and drainage on the entire watershed.

Street Names

The applicant should propose street names that are not likely to cause confusion with existing names. Although actual numbers should not be assigned until buildings are constructed, be sure the applicant is aware of the town's numbering system. Street names should be reviewed by the Selectmen in the manner accepted by the community, and included on the final plat to avoid later misunderstandings (see RSA 231:133-a). For information about naming streets, contact the Bureau of Emergency Communication at the NH Department of Safety. Also refer to the PAS report, *Street-Naming and Property-Numbering Systems*.

Part III. PLANNING BOARD REVIEW AND APPROVAL PROCESS

Preapplication Consultation with Developers

New Hampshire statute (RSA 676:4, II) provides for conceptual consultation and design review with developers. These optional preapplication phases are valuable tools that all planning boards should include in their subdivision and site plan regulations, and encourage every applicant to use. Conceptual consultation allows the developer and board to discuss generally the types of uses most suitable for a particular property. The design review phase is an opportunity for much more detailed discussions. The goal of design review is to assure thorough review and understanding of the essential characteristics of the site, and specific requirements of local regulations, before the final design is prepared.

These nonbinding, preliminary consultations with developers and applicants can smooth the process and increase the likelihood of desirable results, by resolving any areas of concern early in the process. The board must be careful *NOT* to take any kind of "vote," or grant a "preliminary approval" that the developer might interpret as a commitment by the board to a final approval. Approval can come only after the board has received and accepted a formal application, subject to the required public hearing and review.

Approved Plans

The records of every planning board decision on a development application which includes the construction of new roads must clearly specify what the board has approved. State law (RSA 676:3, I) requires the board to give the applicant a final written decision of approval or disapproval of the application.

Either the written decision, or the final plat to be recorded, should spell out all specific construction requirements for all roads. Refer directly to the appropriate road construction standards in the regulations that must be followed as part of the approval, and include a copy of the regulations as part of the written decision and approval record. The board should require a performance bond, or other type of security specified in the development regulations, whenever improvements are required as conditions of subdivision approval. A performance bond guarantees that streets will be constructed, utilities installed, and landscaping and other improvements provided according to the regulations. Always include a detailed description of the required improvements in the security agreement. The termination date of the agreement should allow ample time beyond the expected period for the work, to assure the municipality sufficient time to invoke provisions of the security agreement, if it appears work will not be completed.

Road Agent/Highway Superintendent

The planning board should work closely with elected officials and municipal staff so that they are knowledgeable about the design and construction standards in the development regulations. The road agent or highway superintendent should be prepared to answer questions on road design and locally adopted standards and procedures. Developers might first inquire about design standards by asking the local road official before approaching the planning board.

The road agent/highway superintendent is also a valuable resource to the board, and should be consulted about road designs, and kept fully informed throughout the review process. Since the local road official is often charged with monitoring construction and assuring compliance with approved plans, he or she must be fully informed of all plans approved by the board. If the road agent/highway superintendent will not monitor construction, the decision or record of proceedings should specify how, and by whom, construction will be monitored, and the method for payment of any costs.

State Driveway Permits

Planning boards should actively establish good working relations with their local NH DOT district office (see Where to go for more information). State driveway permits are one of the many reasons that good, two-way communication is important. Locally approved development can affect state driveway permits, and state driveway permits issued can affect local development potential.

The State has jurisdiction over the number of driveways allowed to access State highways, and is required to issue a driveway construction permit if all safety requirements can be met. (See *Administrative Rules for the Permitting of Driveways and Other Accesses to the State Highway System.*)

However, a town can limit or refuse to issue a building permit for a property if the state permit is for a use not allowed by local zoning. All DOT driveway permits include this statement: "The applicant shall comply with all applicable ordinances and regulations of the municipality and other state agencies." Town requirements may be more stringent than the State's, but all permits are subject to approval by NH DOT, and must meet the minimum requirements of the State.

Transportation Improvement Program

The State Transportation Improvement Program (TIP) is the basis of the 10-year transportation plan, which lists and prioritizes State funding for road and bridge projects throughout New Hampshire. Planning boards should work through their regional planning agency to submit local priority projects for inclusion in the regional transportation improvement program (TIP). The regions then submit their plans to NH DOT for incorporation in the state TIP, which is revised every two years.

CONCLUSION

The Planning Board and Street Design

How streets are designed and built is a key part of planned, orderly growth. Design and construction of roads affects the visual quality of communities, public safety and quality of life for years to come. Well-planned and articulated road design and construction standards in the local master plan and land-use regulations pave the way to more desirable development results. Clear and consistent procedures for monitoring development in accordance with approved plans can protect a town from being taken for a ride.

As a key piece of community planning, street planning must be viewed within the context of the whole

community. The planning board has to balance competing needs and interests: transportation needs, safety for all users, livability and attractiveness, social and economic considerations, and environmental impacts. Evaluating and balancing all these needs and interests for each proposed road or street project demands flexibility and judgement.

Planning board members must use a generous measure of judgement and flexibility when enacting and applying design standards and planning regulations. Remember that different streets have different functions, requiring different designs. Design standards should have built-in flexibility for planning development that fits with natural contours, that preserves natural features, and meets other community objectives, such as a more intimate urban village, or scaled streetscapes. Rigid design standards can lead to over-designed roads, which encourage excessive vehicle speeds, and present a less attractive neighborhood streetscape. Rigid standards also inflate street construction costs, which in turn reduces housing affordability. Sound and thoughtful road planning is an essential part of guiding development to preserve valued features of the community, and achieve and enhance community goals.

Where to go for more information:

Regional Planning Commissions:

- North Country Council, Bethlehem: 444-6303
- Lakes Region Planning Commission, Meredith: 279-8171
- Upper Valley/Lake Sunapee Regional Planning Commission, Lebanon: 448-1680
- Southwest Region Planning Commission, Keene: 357-0557
- Central New Hampshire Regional Planning Commission, Penacook: 753-9374
- Southern New Hampshire Planning Commission, Manchester: 669-4664
- Nashua Regional Planning Commission, Nashua: 883-0366
- Rockingham Planning Commission, Exeter: 778-0885
- Strafford Regional Planning Commission, Dover: 742-2523

NH Department of Transportation

District Offices:

- District 1, Lancaster - 788-4641
- District 2, Lebanon - 448-2654
- District 3, Laconia - 524-6667
- District 4, Swanzey - 352-2302
- District 5, Hooksett - 485-9526
- District 6, Durham - 868-1133

NH DOT Highway Aid Funds including:

- State Aid Funds for Class I, II and III Highways
- Bridge Aid Funds
- Highway Block Grant Aid Funds
- Federal Aid Bridge Replacement Funds
- Contribution to Damage Losses

NH DOT Bureau of Municipal Highways
John O. Morton Building,
1 Hazen Drive,
Concord NH (271-2107)

- Bridge Inspections
- Bridge Aid
- Municipal Managed Projects
- Personal Services: Requested Maintenance and Repair Projects, and Engineering Services

NH Department of Environmental Services

Public Information and Permitting Office
6 Hazen Drive, Concord NH (271-2975)

Bureau of Emergency Communication

Located at the NH Department of Safety, James H. Hayes Building, 10 Hazen Drive, Concord, NH 03301-6511 (271-6911)

UNH Technology Transfer Center (UNH T² Center)

Located in Durham, T^2 is an additional source of technical assistance regarding road construction, maintenance and repair. Their mission statement best summarizes what they do: *to foster safe, efficient, environmentally sound local roads in New Hampshire by improving road managers' and crews' knowledge of technology and management through education and training, a quarterly newsletter, technical assistance, and other means of technology transfer.* They have pro-

duced a Tech Sheet titled *Essential Practices for Good Roads*. The T^2 Center can be reached by phone: 862-2826 or 800-423-0060, fax: 862-2364, email: kldr@christa.unh.edu or regular mail: University of New Hampshire, Technology Transfer Center, 33 College Road - Kingsbury Hall, Durham, NH 03824-3591.

Natural Resources Conservation Service, USDA

Federal Building, 2 Madbury Road
Durham NH 03824-1499 (868-7581)

- Belknap (528-8713)
- Carroll (447-2771)
- Cheshire (756-2988)
- Coos (788-4651)
- Grafton (747-2001)
- Hillsborough (673-2409)
- Merrimack (223-6023)
- Rockingham (679-2790)
- Strafford (749-3037)

Planners Book Service, American Planning Association

112 S. Michigan Ave., Suite 1600,
Chicago, IL 60603-6107
(312) 786-6344

New Hampshire Municipal Association

P.O. Box 617, Concord, NH 03302
phone: 224-7447

There are several municipal law lectures that are available from NHMA, including The Basics of Highways and Streets (lecture #1, September 1996), The Risk of the Open Road- A Review of Municipal Liability for Highways, and Other Highway Issues (lecture #3, Spring 1994), Municipal Roads (lecture #2, Fall 1992), and A Hard Road to Travel–The Tortuous By-Ways of N.H. Local Highway Law (lecture #3, Fall 1990).

Sources of Additional Information:

- *Handbook of Subdivision Review - A Guide for New Hampshire Officials*, OSP, 1996
- *Best Management Practices for Urban Stormwater Run-off*, NH DES, 1996
- *Local Low Volume Roads and Streets*, American Society of Civil Engineers, November 1992.
- *Take Back Your Streets: How to Protect Communities from Asphalt and Traffic*, Conservation Law Foundation (phone: 617-350-0990), May 1995
- *Residential Streets*, American Society of Civil Engineers, National Association of Home Builders, Urban Land Institute, 1990.
- *Traffic Calming*, Planners Advisory Service report #456, Cynthia L. Hoyle, July 1995, 28 pp. (available on loan from OSP, or for purchase from APA Planners Book Service)
- *The Subdivision and Site Plan Handbook* David Listokin and Carole Walker, 1989, 438 pp., Center for Urban Policy Research
- *Dealing with Change in the Connecticut River Valley*, Robert D. Yaro, et al., 1988, 184 pp. Lincoln Institute for Policy and the Environmental Law Foundation
- *Preserving Rural Character*, Planners Advisory Service report #429, Fred Heyer, December 1990, 20 pp. (available on loan from OSP, or for purchase from APA Planners Book Service)
- *Stormwater Management and Erosion and Sediment Control for Urban and Developing Areas in New Hampshire*, August 1992, Rockingham County Conservation District, DES, Soil Conservation Service (available from DES, Public Information and Permitting Office).
- *Street-Naming and Property-Numbering Systems*, Planners Advisory Service report #332, Margaret A. Corwin, (available on loan from OSP, or purchase through APA Planners Book Service.)
- *Administrative Rules for the Permitting of Driveways and Other Accesses to the State Highway System* ["Tra 302 Driveway Permits"], NH Department of Transportation, Bureau of Highway Maintenance, 1993
- *Trip Generation* 5th ed. 1990. 1500 pp. (Institute of Traffic Engineers)
- *Model Stormwater Management and Erosion Control Regulation*, February 1997, prepared by the NH Association of Conservation Districts, Water Quality and Urban Conservation Committee (available from OSP or your local county conservation district office)
- *A Hard Road to Travel*, NHMA's Handbook on NH Law of Local Highways, Streets, and Trails, H. Bernard Waugh, Jr., Esq., 1997
- *Subdivision and Site Plan Review Handbook*, Southwest Region Planning Commission, May 1995 (available from OSP)